

CLAIMS

Please amend the claims as follows:

1. (previously presented) A method of operating a data processing network, the method comprising:

performing an initial link layer operating frequency negotiation between a server and a switch to which the server is connected, wherein the initial link layer operating frequency negotiation establishes an initial total bandwidth capacity of a network link between the server and the switch at an initial operating frequency of the network link;

following the initial link layer operating frequency negotiation, the server communicating network traffic with the switch over the network link and measuring an effective data rate of the network traffic communicated between the server and the switch over the network link; and

responsive to determining by the measuring that the effective data rate is materially less than the initial total bandwidth capacity of the network link operating at the initial operating frequency, performing a subsequent link layer operating frequency negotiation to establish a decreased total bandwidth capacity of the network link at a decreased operating frequency of the network link, wherein the decreased operating frequency is closer to the measured effective data rate than the initial operating frequency.

2.-3. (canceled)

4. (previously presented) The method of claim 1, wherein the initial and subsequent link layer operating frequency negotiations are compliant with the IEEE 802.3 standard.

5. (previously presented) The method of claim 1, wherein measuring the effective data rate includes accumulating information indicative of an amount of network traffic over the link during a specified interval and calculating the effective data rate based thereon.

6. (previously presented) The method of claim 1, wherein the method further comprises:
responsive to determining that the effective data rate is greater than a specified percentage of the

initial total bandwidth capacity of the link, performing a subsequent link layer operating frequency negotiation to establish an increased total bandwidth capacity of the network link at an increased operating frequency of the link, wherein the increased operating frequency is higher than the initial operating frequency.

7. (previously presented) A data processing system, comprising:

a processor, memory, and a network interface connected to a switch via a network link;

wherein the network interface performs an initial link layer operating frequency negotiation with the switch that establishes an initial total bandwidth capacity of the network link at an initial operating frequency of the network link and thereafter communicates network traffic with the switch over the network link and measures an effective data rate of the network traffic communicated between the data processing system and the switch over the network link; and

wherein the network interface performs a subsequent link layer operating frequency negotiation to establish a decreased total bandwidth capacity of the network link at a decreased operating frequency of the network link responsive to determining by measurement that the effective data rate is materially less than the initial total bandwidth capacity of the network link operating at the initial operating frequency, wherein the decreased operating frequency is closer to the measured effective data rate than the initial operating frequency.

8.-9. (canceled)

10. (previously presented) The data processing system of claim 7, wherein the initial and subsequent link layer operating frequency negotiations are compliant with the IEEE 802.3 standard.

11. (previously presented) The data processing system of claim 7, wherein the network interface measures the effective data rate by accumulating information indicative of an amount of network traffic communicated with the switch via the network link during a specified interval and calculating the effective data rate based thereon.

12. (previously presented) The data processing system of claim 7, wherein:

the network interface performs a subsequent link layer operating frequency negotiation to establish an increased total bandwidth capacity of the network link at an increased operating frequency of the link responsive to determining that the effective data rate is greater than a specified percentage of the initial total bandwidth capacity of the link, wherein the increased operating frequency is higher than the initial operating frequency.

13. (previously presented) The data processing system of claim 7, wherein the initial and subsequent link layer operating frequency negotiations are initiated by the switch.

14. (previously presented) The data processing system of claim 7, wherein the initial and subsequent link layer operating frequency negotiations are initiated by the data processing system.

15. (previously presented) A data processing network, comprising:

- the data processing system of Claim 7;
- the switch; and
- the link.

16.-20. (canceled)

21. (previously presented) A computer program product comprising:

- a tangible computer-readable storage medium;
- machine-executable instructions, stored on the tangible computer-readable storage medium, for conserving energy in a data processing network having a switch, a server, and a network link connecting the switch to the server, wherein the instructions when executed cause a machine to perform:

- performing an initial link layer operating frequency negotiation between the server and the switch, wherein the initial link layer operating frequency negotiation establishes an initial total bandwidth capacity of a network link at an initial operating frequency of the network link;

- thereafter detecting whether or not the network link is underutilized by:

measuring an effective data rate of network traffic communicated between the server and the switch over the network link; and

determining, responsive to the measuring, whether or not the effective data rate is materially less than the initial total bandwidth capacity of the network link;

responsive to detecting that the link is underutilized because the effective data rate is materially less than the initial total bandwidth capacity of the network link operating at the initial operating frequency, performing a subsequent link layer operating frequency negotiation to establish a decreased total bandwidth capacity of the network link at a decreased operating frequency of the network link, wherein the decreased operating frequency is closer to the measured effective data rate than the initial operating frequency.

22. (previously presented) The computer program product of claim 21, wherein measuring the effective data rate includes determining an amount of network traffic traversing the network link during a specified interval.

23. (previously presented) The computer program product of claim 22, wherein the instructions further cause the machine to perform:

determining whether or not the network link is over-utilized by detecting whether the effective data rate is greater than a specified percentage of the initial total bandwidth capacity of the link; and

responsive to detecting that the link is over-utilized because the effective data rate is greater than a specified percentage of the initial total bandwidth capacity of the link, performing a subsequent link layer operating frequency negotiation to establish an increased total bandwidth capacity of the network link at an increased operating frequency of the link, wherein the increased operating frequency is higher than the initial operating frequency.

24. (previously presented) The method of claim 1, wherein the decreased operating frequency is a lowest operating frequency of the network link accommodated by the server and switch that is sufficient to handle the effective data rate.

25. (previously presented) The method of claim 1, and further comprising:

automatically repeating, at specified intervals during the operation of the data processing network, the measuring of the effective data rate and contingent initiation of a subsequent link layer operating frequency negotiation to automatically and periodically modify the operating frequency of the network link to a lowest operating frequency compatible with the effective data rate.

26. (previously presented) The method of claim 1, and further comprising:

in response to performing the subsequent link layer operating frequency negotiation, decreasing an operating frequency and power consumption of a network interface of the server.

27. (previously presented) The data processing system of claim 7, wherein the decreased operating frequency is a lowest operating frequency of the network link accommodated by the server and switch that is sufficient to handle the effective data rate.

28. (previously presented) The data processing system of claim 7, wherein the network interface automatically repeats, at specified intervals during the operation of the network link, measurement of the effective data rate and contingent initiation of a subsequent link layer operating frequency negotiation to automatically and periodically modify the operating frequency of the network link to a lowest operating frequency compatible with the effective data rate.

29. (previously presented) The data processing system of claim 7, wherein the network interface, responsive to performing the subsequent link layer operating frequency negotiation, decreases its operating frequency and power consumption.

30. (previously presented) The program product of claim 21, wherein the reduced operating frequency is a lowest operating frequency of the network link accommodated by the server and switch that is sufficient to handle the effective data rate.

31. (previously presented) The program product of claim 21, wherein the instructions further cause the machine to perform:

automatically repeating, at specified intervals during the operation of the network link, measurement of the effective data rate and contingent initiation of a subsequent link layer operating frequency negotiation to automatically modify the operating frequency of the network link to a lowest operating frequency compatible with the effective data rate.

32. (previously presented) The program product of claim 21, wherein the instructions further cause the machine to perform:

responsive to performance of the subsequent link layer operating frequency negotiation, decreasing an operating frequency and power consumption of a network interface of the server.

33. (new) A data processing system, comprising:

a processor, memory, and a network interface connected to a switch via a network link, the network interface including:

means for performing an initial link layer operating frequency negotiation with the switch that establishes an initial total bandwidth capacity of the network link at an initial operating frequency of the network link;

means for thereafter communicating network traffic with the switch over the network link;

means for measuring an effective data rate of the network traffic communicated between the data processing system and the switch over the network link; and

means for performing a subsequent link layer operating frequency negotiation to establish a decreased total bandwidth capacity of the network link at a decreased operating frequency of the network link responsive to determining by measurement that the effective data rate is materially less than the initial total bandwidth capacity of the network link operating at the initial operating frequency, wherein the decreased operating frequency is closer to the measured effective data rate than the initial operating frequency.